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A LIST OF THE BUPRESTIDAE (COLEOPTERA) OF THE SYDNEY BASIN, NEW SOUTH WALES, WITH ADULT FOOD PLANT RECORDS AND BIOLOGICAL NOTES ON FOOD PLANT ASSOCIATIONS

By G. A. Williams *and* T. Williams
C/- Post Office, Lansdowne via Taree, N.S.W. 2435

Abstract

180 species of Buprestidae are listed as having been recorded from the Sydney Basin since settlement. 143 species have been taken by the authors since 1970 representing 80% of the total. 61 species of adult food plants have been recorded by various authors and 45 of these were encountered during our study. Data on frequency status, seasonal occurrence, adult food plants, distribution and habits are given. *Stigmodera* species are viewed as significant pollinators of Myrtaceae dominated communities within the Sydney Basin and pollinator-food plant associations postulated from observations.

Introduction

Until recently little attempt had been made to survey Australian invertebrate communities with little attention given to those areas impinged upon by urban development. Of the insects, apart from the relatively well studied Lepidoptera, few orders have drawn attention and this has largely been of a taxonomic nature with distribution and frequency data derived only as an incidental adjunct. This study surveys the Buprestidae or "jewel" beetles of the Sydney Basin.

The Sydney Basin is some 36,000 sq km in extent and forms a wedge-shaped area on the eastern seaboard of New South Wales approximately delimited by Lithgow, Newcastle and Batemans Bay (Fig. 1). The study was confined to the Central and Western Areas of the Sydney Basin as figured in Branagan, Herbert and Langford-Smith (1979: 5). Altitude increases from sea-level to 1100 m at Mt. Victoria in the Blue Mountains.

Dominant rock types of the basin weather to a particularly poor soil (Gold and Prineas 1978) but nevertheless support a rich and diverse flora. Beadle, Evans and Carolin (1972) list some 2,000 species of native plants from the Sydney region; the 180 species of Buprestidae recorded here can be viewed as a reflection of that floristic richness.

Three authors have surveyed the buprestid fauna in areas within the Sydney Basin; Williams (1977) and Hawkeswood (1978) provide data on the species occurring at East Minto and Glenbrook respectively and Nikitin (1979) lists species encountered within the County of Cumberland. A considerable amount of data no doubt exist in collections, both institutional and private, but no effort has been made to intergrate such data. The efforts of early collectors, however, in amassing collections of species were not matched by an equal attention to labelling. As a consequence there is a paucity of information on the early buprestid fauna. Representations of species within collections are often inversely proportional to their natural frequency; the more common species usually being ignored in the field and those less frequently encountered consistently procurred. Thus, old museum data may offer scant insight into the faunal diversity and frequency in the area.

Observations and collection of buprestids has been undertaken by the present authors for some years, especially since 1976. Our collection sites (Fig. 1) are arranged in geographical clusterings approximating the three major geologic regions (based on topography and dominating bedrocks) within the study area.

Adult food plants are listed in Table 1. Table 2 lists those buprestid species encountered primarily by the authors. The frequency status given in this table follows that of Williams (1977) and Hawkeswood (1978) where "rare" indicates fewer than three specimens, "few" means three to ten and "common" greater than ten specimens encountered over the period of study. We recognize the failings of such an arbitary assessment but it provides a useful comparative standard. It must be emphasized, however, that the local status of a species in both space and time is often highly variable; the biology of most buprestids is totally unknown and the triggering mechanisms (rainfall, temperature etc.) that initiate emergence poorly understood. Thus a reappraisal in some instances may be required in the future.

Table 3 lists those buprestid species that have not been observed by us but are represented primarily in the collection of the Australian Museum (Sydney), and to a lesser extent, in the Henry Schrader Collection (recently sold to a number of individual collectors: the majority of the Australian *Stigmodera* now being in the collection of Mr Allen Sundholm). Primarily we have based our considerations on species personally encountered; only where species were not thus observed is recourse made to the records of other authors and museum data. Data from a previous study by one of us (Williams 1977) are repeated here for those species not encountered again since that study and for those species infrequently recorded.

In addition to those species listed in Tables 2 and 3 Hawkeswood (1978) lists from the lower Blue Mountains *Melobasis costata* Macleay, *Cisseis atroviolacea* Thomson, *C. maculata* Laporte and Gory, *C. pygmaea* Blackburn, *C. ruseocuprea* Hope and *C. vicina* Kerremans. Nikitin (1979) lists *Stigmodera jospilota* Laporte and Gory and provides a coastal record for *Stigmodera victoriensis* Blackburn. His most interesting records are for *Stigmodera goryi* Laporte and Gory, "one

living specimen was collected on a eucalypt trunk at Cabramatta on 19 Dec. 1959, and one dead specimen was excavated from a tunnel in the trunk of *Eucalyptus* sp. in Fairfield Park on 13 Aug. 1959". These represent the most recent records of this species within the Sydney Basin.

We have also seen, in the collection of Mr D.P. Carne of Sydney, specimens of what appear to be *Stigmodera mustelamajor* Thomson taken by him in the vicinity of Maroota on *Eucalyptus* blossom.

TABLE 1

List of adult food plants. Plants are listed systematically. Capital letters relate to collection sites in Fig. 1; months indicate dates of observations. Duplicates of the food plants were submitted to the National Herbarium, Sydney, for identification and a representative series lodged with N.P.W.S., Taree.

Family Proteaceae

1. *Isopogon anemonifolius* (Salisb.) Knight.–B, Dec.
2. *Banksia* sp. (unidentified).–C, Dec.; U.
3. *Hakea teretifolia* (Salisb.) J. Britt.–N, Dec.; L, Jan.

Family Mimosaceae

4. *Acacia decurrens* (Wendl.) Willd.–O, Oct., Nov., Dec.; I, V, Nov.; C, H, B, Dec.
5. *Acacia falcata* Willd.–O, Dec.
6. *Acacia longifolia* (Andrews) Willd.–C, M, K, Oct.; C, I, Nov.; I, C, Y, Z, Dec.; O, Y, Jan.
7. *Acacia obtusifolia* A. Cunn.–X, Dec.; Z, Dec.
8. *Acacia parramattensis* Tindale.–H, Dec.
9. *Acacia* sp. (unidentified)

Family Fabaceae

10. *Daviesia latifolia* R. Br.–X, Oct.
11. *Dillwynia floribunda* Sm.–L, Oct.
12. *Dillwynia retorta* (Wendl.) Druce.–X, Nov.
13. *Dillwynia sericea* A. Cunn.–U, Nov.
14. *Jacksonia scoparia* R. Br.–O, Oct.
15. *Phyllota grandiflora* (Sieb. ex DC.) Benth.–N, Oct.
16. *Phyllota phylicoides* (Sieb. ex DC.) Benth.–C1, Sep.
17. *Pultenaea brunioides* (Meisn.) J. Thompson.–R, Nov.
18. *Pultenaea ferruginea* var. *deanei* (R. T. Baker) Williamson.–O, Oct.
19. *Pultenaea elliptica* Sm.–L, N, C, B, Dec.
20. *Viminaria juncea* (Schrad.) Hoffmgg.–C, Dec.; K, Nov.

Family Myrtaceae

21. *Backhousia myrtifolia* Hook. f. et Harv.–C, Dec.
22. *Angophora hispida* (Sm.) D. Blaxell.–A, B; C, I, J, K, L, N, Nov., Dec.; rarely Oct. and Jan.
23. *Eucalyptus ?luehmanniana* F. Muell.–C, Dec.
24. *Eucalyptus obtusiflora* DC.–C, Dec.
25. *Eucalyptus ?racemosa* Cav.–I, Dec.
26. *Eucalyptus sieberi* L. Johnson.–C, Oct.
27. *Eucalyptus* sp. (unidentified)
28. *Leptospermum attenuatum* Sm.–C1, L, Oct.; I, J, U, Nov.; B, X, Dec.
29. *Leptospermum flavescens* Sm.–B, C, C1, D, E, H, I, J, K, L, M, N, Oct., Nov., Dec.; Q, R, U, V, W, X, Y, Z, Dec., Jan.
30. *Leptospermum juniperinum* Sm.–A, B, Dec.; Y, Z, Jan.
31. *Leptospermum parvifolium* Sm.–C1, L, Sep., Oct.; R, Nov.

32. *Leptospermum squarrosum* Sol. ex Gaertn.–C, Dec.
33. *Leptospermum* sp. (an apparently undescribed sp.).–X, Dec., Jan.
34. *Leptospermum* sp. (unidentified)
35. *Kunzea ambigua* (Sm.) Druce.–B, C, C1, E, J, L, N, O, Q, R, S, Oct., Nov., Dec.
36. *Melaleuca armillaris* (Soland. ex Gaertn.) Sm.–D, Nov.
37. *Baeckea densifolia* Sm.–B, Dec.
38. *Baeckea imbricata* (Gaertn.) Druce.–A, C, Dec.
39. *Calytrix tetragona* Labill.–C1, Sep.

Family Casuarinaceae
40. *Casuarina distyla* Vent.–A, B, Y, Dec.
41. *Casuarina cunninghamiana* Miq.–D, Oct., Nov.
42. *Casuarina littoralis* Salisb.–A, C, O, Dec., Jan.
43. *Casuarina* sp. (unidentified).–C, Z, Dec., Jan.

Family Santalaceae
44. *Leptomeria acida* R. Br.–X, Dec.

Family Rutaceae
45. *Eriostemon australasius* Pers.–C1, Sep.

Family Apiaceae
46. *Actinotus helianthi* Labill.–S, Nov.

Family Epacridaceae
47. *Epacris microphylla* R. Br.–Q, Oct.
48. *Epacris obtusifolia* Sm.–C, Oct.

Family Asteraceae
49. *Cassinia aculeata* (Labill.) R. Br.–V, Dec.
50. *Cassinia aureonitens* N. A. Wakefield.–C, Nov.
51. *Cassinia* sp. (unidentified)
52. *Helichrysum diosmifolium* (Vent.) Sweet.–C, Nov.

Family Xanthorrhoeaceae
53. *Xanthorrhoea* sp. (unidentified).–J, N, Dec.

Family Cunoniaceae
54. *Ceratopetalum gummiferum* Sm.–C, Nov.

TABLE 2

List of Buprestidae encountered. Species are listed systematically. Months indicate first and last dates of sightings; capital letters relate to collection sites in Fig. 1; numerals relate to adult food plants listed in Table 1. Asterisks (*) indicate records from flowers only; other species were principally recorded from foliage only. Voucher specimens have been lodged in the Australian Museum, Sydney, and a larger series retained by us.

Subfamily Buprestinae

Agrilus australasiae Laporte & Gory.–22 Oct.-31 Dec., common. B, C, H, I, O, V, 4, 8, 9.
**Ethon affine* Laporte & Gory.–1 Oct.-17 Nov., common. K, N, O, T, 11, 14, 15, 18.
**Ethon* sp. near *affine* Laporte & Gory.–30 Sep.-6 Oct., few. C, N, 15,
**Ethon corpulentum* Boheman.–30 Sep.-18 Nov., common. C, K, X, 10.
**Ethon fissiceps* (Kirby).–30 Sep.-14 Oct., common. C, K, L, N, 11.
**Ethon leai* Carter.–6-18 Nov., few. Q, U, X, 12, 13.
Ethon sp. near *leai* Carter.–6 Nov., rare. Q.
**Ethon bicolor* Laporte & Gory.–30 Dec.-4 Jan., rare. Z, 29.
Cisseis acuducta (Kirby).–30 Sep.-8 Dec., common. C1, K, L, N, O, Q, T, V, X, 7, 11, 12, 14, 15, 16, 20.
Cisseis aurocyanea Carter.–30 Dec.-4 Jan., few. Y, 6.

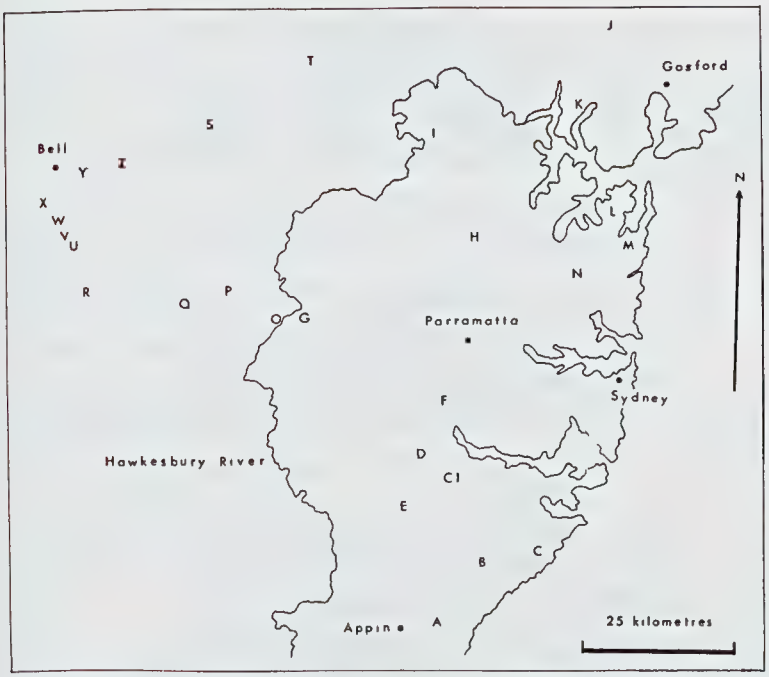

Fig. 1. List of collecting sites with description of the site vegetation. The vegetation of study sites is not necessarily typical of the immediate surrounding district.

Coastal Plain

A. Woronora Dam: dry sclerophyll forest merging to woodland.
B. Waterfall: dry sclerophyll forest merging to low open woodland.
C. Royal National Park: gully restricted rain forest, dry sclerophyll forest and woodland intermixed with heath. Sites, in the main, restricted to central, eastern and north-eastern sections of the Park.
C1. Heathcote Road; between Liverpool and Heathcote: dry sclerophyll forest merging to open woodland. Military reserve adjoins southern side of road.
D. Glenfield: lightly timbered pasture with some areas planted to native gardens.
E. East Minto: dry sclerophyll forest intermixed with woodland.
F. Cabramatta: medium density residential suburb with residual areas, mainly creek restricted, of native flora.
G. Penrith: light to medium density residential suburb at foot of Blue Mountains: scattered individual and small tree clusterings.
H. Middle Dural: dry sclerophyll forest.
I. Maroota: dry sclerophyll forest.
J. Peats Ridge: tall to low woodland.
K. Calga: dry sclerophyll forest.
L. Ku-ring-gai Chase National Park: West Head Section. woodland.
M. Ingleside: dry sclerophyll forest.
N. Mona Vale Road between St. Ives and French's Forest turnoff: woodland.

Lower Blue Mountains

O. Lapstone Hill: dry sclerophyll forest.
P. Springwood: dry sclerophyll forest.
Q. Woodford: dry sclerophyll forest.
R. Katoomba: low woodland merging to exposed heath above cliff face.
S. Mountain Lagoon: dry sclerophyll forest.
T. Colo Heights: dry sclerophyll forest.

Western Blue Mountains

U. Blackheath: woodland interspersed with low wind-exposed heathland.
V. Mt. Boyce: "mallee" dominated woodland on ridge top.
W. Mt. Victoria: dry sclerophyll forest verging to woodland.
X. Mt. York: dry sclerophyll forest.
Y. Bell's Line of Road between Bell and Mt. Wilson turnoff; Blue Mountains National Park: dry sclerophyll forest merging to woodland.
Z. Mt. Wilson: dry sclerophyll forest with interspersed escarpment rain forest.

Cisseis cupripennis Guerin.–13 Nov.-10 Jan., common. A, C, I, X, Y, Z, 4, 6, 7, 29.
Cisseis duodecimmaculata Fabricius.–10 Dec.-29 Jan., common. J, N, P, Y, 40, 53.
Cisseis heroni Carter.–18 Nov.-26 Dec., few. I, O, 4, 5, 10.
Cisseis leucosticta (Kirby).–26 Dec.-28 Jan., common. I, P, X, Y, 6, 7, 9.
Cisseis marmorata Laporte & Gory.–25 Nov.-26 Dec., rare. I, P, 4.
* *Cisseis nitidiventris* Carter.–21 Nov.-13 Jan., common. C, L, Q, W, X, 29, 34.
* *Cisseis notulata* Germar.–21 Nov.-4 Jan., common. A, B, C, C1, H, I, J, I . N, V, X, Y, 3, 22, 28, 29, 38.
* *Cisseis obscura* Blackburn.–31 Dec., rare. A, 38.
Cisseis scabrosula Kerremans.–6 Oct.-5 Jan., common. C, I, K, M, O, Y, Z, 4, 6, 7, 9, 29, 43.
Cisseis sp. near *vicina* Kerremans.–24 Nov.-4 Jan., common. A, C, H, L, M, V, W, 29, 44.
Cisseis sp. No. 1.–7 Dec.-20 Jan., common. B, C, H, L, N, 1, 3, 8, 29, 32, 34. Small species 3-5 mm in length, dorsal surface bronze.
Cisseis sp. No.2.–21 Nov.-5 Jan., few. C, O, 5, 6. Similar in size and colour to preceding sp. but with distinguishing areas of pubescence on dorsal surface.
Cisseis sp. No. 3.–25 Nov.-7 Dec., few. H, I, 4, 8. Small species 5-6 mm in length, pronotum nitid green, elytra black with, in fresh specimens, white dots of pubescence on the apical third.
Cisseis sp. No. 4.–30 Dec. Y, 6. Length 8 mm, pronotum bronze, elytra almost cuneate, black with an obscured pubescence.
Paracephala cyaneipennis Blackburn.–9-19 Dec., common. A, C, L, N, O, 29, 40, 41.
Paracephala murina Thomson.–16-30 Dec., common. A, B, C, 40.
Germarica lilliputana (Thomson).–9-20 Dec., common. A, B, C, L, N, O, 40, 42.
* *Merimna atrata* Hope.– 15 Dec., rare. C, 22.
Astraeus crassus Van de Poll.–11 Oct.-28 Nov., common. D, 41.
Astraeus dilutipes Van de Poll.–15 Dec.-5 Jan., few. A, O, X, 42, 43.
Astraeus pygmaeus Van de Poll.–15 Dec.-5 Jan., few. A, O, 42.
Nascio vetusta Boisduval.–28 Nov., rare. C. Outside of study area we have seen this species on trunks of *Eucalyptus* sp.
Melobasis cupriceps (Kirby).–14-16 Dec., common. C, 20.
Melobasis cuprifera Laporte & Gory.–30 Sep.-30 Dec., common. C, C1, L, N, O, R, T, U, X, 10, 12, 13, 14, 16, 17, 19, 34.
Melobasis fulgurans Thomson.–15 Dec., rare X, 7.
Melobasis gloriosa (Thomson).–30 Oct., rare. P, 9.
Melobasis nitidiventris Kerremans.–6-14 Oct., rare. K, L, 9.
Melobasis purpurescens Fabricius.–29 Nov.-31 Dec., few. A, F, G, X, 6, 29.
Melobasis sp. near *semisuturalis* Blackburn.–27 Nov., rare. K, 27.
* *Melobasis* sp.–22 Oct., rare. O, 14. Dorsal surface glabrous, elytra costate.
* *Torresita cuprifera* (Kirby).–27 Oct.-11 Jan., common. C, J, X, Z, 22, 26, 29.
* *Anilara ?obscura* Macleay.–8 Dec., rare. U, 29.
Anilara sulcipennis Kerremans.–15 Dec.-5 Jan., common. O, 42.
* *Neocuris anthaxioides* Fairmaire.–25 Nov., few. I, 29.
* *Neocuris* sp. near *coerulans* Fairmaire.–16-29 Dec., few. C, U, 29.
* *Neocuris cuprilatera* Fairmaire.–7-14 Dec., rare. C, H, 29.
* *Neocuris gracilis* Macleay.–21 Nov.-11 Jan., common. C, C1, H, I, J, U, V, X, Z, 21, 28, 29, 30, 35, 46.
* *Neocuris* sp. near *gracilis* Macleay.–6 Dec.-4 Jan., few. C, Z, 21, 29.
* *Neocuris guerini* Hope.–25 Nov.-17 Dec., few. C, E, I, 29, 35.
* *Neocuris ?crassa* Obenberger.–21 Nov.-19 Dec., few. A, C, C1, 29.
* *Pseudoanilara cupripes* (Macleay).–25 Nov., rare. C, 54.
Pseudoanilara purpureicollis Macleay.–17 Dec., rare. D, 41.
* *Curis aurifera* Laporte & Gory.–7 Nov.-13 Jan., rare. D, X, 33, 36.
* *Curis caloptera* Boisduval.–2-29 Dec., few. A, C, E, Z, 22, 29.
* *Stigmodera jacquinoti* Boisduval.–13-16 Dec., rare. C1, J, 22.
* *Stigmodera macularia* (Donovan).–13 Nov.-4 Jan., common. C, E, J, U, Z, Y, 22, 29, 34.

* *Stigmodera affinis* Saunders.–27 Dec., rare. C1, 22.
* *Stigmodera grandis* (Donovan).–16-31 Dec., rare. C1, I, 22.
* *Stigmodera limbata* (Donovan).–16 Dec.-13 Jan., rare. C, C1, U, 22, 29.
* *Stigmodera* sp. near *mitchelli* Hope.–15 Dec., rare. X, 28.
* *Stigmodera suturalis* (Donovan).–16-29 Dec., common. C, C1, 22.
* *Stigmodera thoracica* Saunders.–28 Nov., rare. F (dead on ground).
* *Stigmodera variabilis* (Donovan).–4 Dec.-28 Jan., common. C, C1, I, U, V, W, X, 22, 29, 33, 34.
* *Stigmodera alternecosta* Thomson.–7-26 Dec., rare. H, X, 29, 33.
* *Stigmodera amplipennis* Saunders.–22-30 Dec., rare. C1, X, 22, 29.
* *Stigmodera andersoni* Laporte & Gory.–6 Dec.-22 Jan., common. A, B, C, C1, E, I, J, Q, Y, 22, 29, 34.
* *Stigmodera armata* Thomson.–22 Dec., rare. C1, 22.
* *Stigmodera assimilis* Hope.–27 Oct.-14 Dec., common. C, C1, 22, 23, 29, 35.
* *Stigmodera australasiae* Laporte & Gory.–27 Oct.-11 Jan., common. C, C1, E, I, J, L, O, Q, V, X, Z, 22, 27, 28, 29, 33, 34, 35, 37.
* *Stigmodera balteata* Saunders.–26 Nov.-12 Dec., few. E, 29.
* *Stigmodera bella* Saunders.–13 Nov.-29 Jan., common. B, C, E, J, P, V, X, Z, 22, 23, 24, 29, 33, 34, 35.
* *Stigmodera bifasciata* (Hope).–27 Oct.-4 Jan., common. C, C1, E, J, Q, S, X, Y, Z, 22, 27, 29, 30, 34, 35.
* *Stigmodera bremei* (Hope).–29 Dec.-13 Jan., few. U, W, X, Z, 29, 33, 34.
* *Stigmodera brutella* Thomson.–30 Dec.-20 Jan., rare. U, X, 29.
* *Stigmodera burchelli* Laporte & Gory.–15 Dec., rare. C, 22.
* *Stigmodera commixta* Carter.–29 Dec.-28 Jan., few. U, Z, 29, 34.
* *Stigmodera costata* Saunders.–13 Nov.-16 Dec., common. C, D, 22, 23, 29, 34, 35.
* *Stigmodera costipennis* Saunders.– 14-22 Dec., rare. C1, X, 29, 34.
* *Stigmodera crenata* (Donovan).–27 Oct.-31 Dec., common. A, C, C1, 22, 29, 35.
* *Stigmodera cruenta* Laporte & Gory.–24 Nov.-22 Jan., common. C, C1, E, J, Q, 22, 29.
* *Stigmodera cruentata* (Kirby).–27 Oct.-14 Dec., common. C, C1, J, L, 22, 27, 29, 34, 35.
* *Stigmodera cupricollis* Saunders.–26 Dec.-28 Jan., few. U, V, W, X, 29, 33, 34.
* *Stigmodera decemmaculata* (Kirby).–6 Oct.-6 Nov., common. C1, K, L, Q, 28, 31, 34.
* *Stigmodera delectabilis* Hope.–30 Dec., rare. X, 29.
* *Stigmodera dimidiata* Carter.–27 Oct., rare. C, 48.
* *Stigmodera discoidea* Carter.–30 Dec., rare. Y, 29.
* *Stigmodera erythroptera* (Boisduval).–27 Oct.-30 Dec., common. C, C1, I, J, X, Z, 22, 25, 29, 33, 34.
* *Stigmodera flavopurpurea* Carter.–18 Dec.-4 Jan., few. U, W, Y, 29, 34.
* *Stigmodera flavopicta* (Boisduval).–22 Oct.-29 Dec., few. C, O, Z, 29, 50, 52.
* *Stigmodera gentilis* Kerremans.–21 Nov.-26 Dec., rare. C, Z, 29.
* *Stigmodera grata* Saunders.–8-29 Dec., few. C1, V, X, 29.
* *Stigmodera hilaris* Hope.–26 Dec., rare. X, 33.
* *Stigmodera hoffmanseggi* Hope.–26 Dec., rare. V, 29.
* *Stigmodera ignota* Saunders.–26 Dec.-21 Jan., rare. U, W, X, 29.
* *Stigmodera imitator* Carter.–13 Nov.-13 Jan., common. C, V, X, Z, 29, 34, 35.
* *Stigmodera indistincta* Saunders.–25-29 Dec., few. J, Z, 22, 29.
* *Stigmodera kerremansi* Blackburn.–13 Nov.-28 Jan., common. B, C, C1, V, X, Z, 22, 23, 27, 29, 33, 34.
* *Stigmodera kershawi* Carter.–29 Dec.-13 Jan., rare. V, W, Y, 29, 34.
* *Stigmodera kirbyi* (Guérin).–6 Oct.-18 Nov., common. C, L, Q, R, U, 17, 22, 28, 31, 47.
* *Stigmodera klugi* Laporte & Gory.–24 Nov.-13 Jan., few. C, C1, X, 22, 29, 35.
* *Stigmodera luteipennis* Gory.–2-17 Dec., rare. C1, E, 22, 29.
* *Stigmodera nasuta* Saunders.–22-30 Dec., rare. U, W, 29, 34.
* *Stigmodera neglecta* Carter.–30 Dec., rare. Y, 29.
* *Stigmodera octomaculata* Saunders.–21 Nov.-30 Dec., common. C, C1, V, W, X, Z, 22, 29, 33, 34.

* *Stigmodera octospilota* Laporte & Gory.–27 Oct.-11 Jan., common. C, C1, H, I, J, L, N, Q, U, W, X, Z, 22, 28, 29, 30, 34, 35.
* *Stigmodera parallela* White.–15 Sep.-25 Nov., common. C, C1, I, K, L, M, N, 22, 28, 29, 31, 34, 35, 39, 45.
* *Stigmodera pertyi* Laporte & Gory.–4 Nov., rare. C1, 34.
* *Stigmodera piliventris* Saunders.–24 Nov.-26 Dec., few. C, X, 22, 29.
* *Stigmodera praetermissa* Carter.–30 Dec.-4 Jan., few. X, 29, 33.
* *Stigmodera pulchripes* Blackburn.–30 Dec., rare. Y, 29.
* *Stigmodera quadrifoveolata* Obenberger.–27 Oct.-29 Dec., few. C, C1, X, Z, 22, 29, 35.
* *Stigmodera rectifasciata* Saunders.–17 Nov.-11 Jan., common. L, X, Y, 29, 33.
* *Stigmodera rotundata* Saunders.–13 Nov.-4 Dec., common. C, 22, 29.
* *Stigmodera rufipennis* (Kirby).–27 Oct.-30 Dec., common. C, C1, J, V, Y, Z, 22, 26, 29, 34, 35.
* *Stigmodera scalaris* (Boisduval).–27 Oct.-29 Jan., common. A, C, C1, K, L, M, P, U, V, X, Z, 3, 22, 28, 29, 34, 35.
* *Stigmodera semicincta* Laporte & Gory.–14 Jan., rare. U, 34.
* *Stigmodera sexguttata* Macleay.–13 Nov.-16 Dec., common. C, J, 22, 23, 29, 34.
* *Stigmodera sexplagiata* Gory.–6 Oct.-13 Jan., common. B, C, C1, I, L, M, N, O, V, W, X, Z, 3, 22, 27, 28, 29, 30, 31, 35, 51.
* *Stigmodera skusei* Blackburn.–6 Dec.-28 Jan., few. B, C, Q, V, X, Z, 24, 28, 29, 30, 33, 34, 49.
* *Stigmodera spilota* Laporte & Gory.–6 Dec.-22 Jan., few. C, C1, Q, 22, 29.
* *Stigmodera spinolae* Gory.–27 Nov.-29 Dec., rare. E, Z, 29.
* *Stigmodera subgrata* Blackburn.–4 Dec., rare. Y, 29.
* *Stigmodera subpura* Blackburn.–27 Oct.-16 Dec., common. C1, E, 22, 28, 29, 35.
* *Stigmodera terminalis* Kerremans.–31 Dec.-22 Jan., rare. I, Q, 22, 29.
* *Stigmodera thomsoni* Saunders.–30 Dec.-13 Jan., few. W, X, 29, 34.
* *Stigmodera tricolor* (Kirby).–17 Nov.-23 Feb., common. I, L, M, N, 3, 22, 27, 28, 29, 35.
* *Stigmodera undulata* (Donovan).–13 Nov.-31 Dec., common. A, B, C, Z, 22, 29, 34.
* *Stigmodera variopicta* Thomson.–30 Dec.-13 Jan., few. U, X, 29, 33, 34.
* *Stigmodera vicina* Saunders.–27 Oct.-21 Jan., few. C, C1, X, 22, 28, 34.
* *Stigmodera victoriensis* Blackburn.–30 Dec., rare. Z, 29.
* *Stigmodera* sp. No. 1.–8 Dec., rare. X, 34. Similar in colour to *S. sexplagiata* but with elytra strongly accuminate and possibly an aberation of that species.
* *Stigmodera* sp. No. 2.–30 Dec., rare. Y, 29. Similar to *S. sexplagiata* but is readily distinguished by its highly polished bronze pronotum and bronze ventral surface.
* *Stigmodera* sp. No. 3.–30 Dec., rare. X, 33. Close to *S. kershawi* and a possible aberation of that species.

Subfamily Chalcophorinae

Cyria imperialis (Fabricius).–11 Dec.-21 Jan., few. C, U, X, 2, 34.
Iridotaenia albivittis Hope.–30 Dec.-12 Jan., rare. X, 27.

TABLE 3

Summary of data derived from The Australian Museum and Henry Schrader Collections. [Species not encountered by the present authors or appearing in Hawkeswood (1978) or Nikitin (1979)].

Subfamily Buprestinae

Alcinous nodosus Kerremans.–National Park, 27 Jan. 1934; Otford, 31 Dec. 1962.
Ethon latipennis (Macleay).–Sydney.
Cisseis rubicunda Kerremans.–Blue Mountains.
Cisseis viridiceps Kerremans.–Northbridge, Nth. Sydney, Dec. 1914; Enfield, 27 Nov. 1910; Abbotsfield.

Paracephala thoracica Kerremans.–Pt. Hacking, 3 Jan. 1926.
Prosopheres aurantiopictus Laporte & Gory.–Sydney, 17 Mar. 1941; Mt. Irvine, 14 Mar. 1941.
Xyroscelis crocata Laporte & Gory.–Woy Woy.
Astraeus jansoni Van de Poll.–Blue Mountains (noted in Carter 1933 but probably confused with *A. dilutipes*).
Nascioides carissima Waterhouse.–Cooks River, 11 Oct. 1913, Oct. 1913 and Oct. 1914 on *Acacia longifolia.*
Nascioides costata Carter.–Mt. Wilson, 10 Jan. 1963.
Nascio xanthura Laporte & Gory.–Asquith.
Melobasis semisuturalis miranda Kerremans.–Sydney, Sep. 1931.
Melobasis splendida splendida (Donovan).–Sydney.
Anilara deplanta Thery.–Sydney.
Anilara pagana Obenberger.–Kurrajong, 25 Jan. 1913 on leaves of dying *Eucalyptus*; Sydney.
Notographus sp. Thomson.–Sydney; Blue Mountains.
Stigmodera goryi Laporte & Gory.– Lakemba, Feb. 1923; Enfield, 18 Jan. 1910; Glebe, 10 Oct. 1931; Chatsworth.
Stigmodera praeterita Carter.–Wahroonga; Ku-ring-ai, 1923; Mona Vale, 2 Dec. 1923.
Stigmodera sexmaculata Saunders.–Upper Colo River, 10 Dec. 1936.
Stigmodera vitticollis Macleay.–Kingswood, Mar. 1964.
Stigmodera abdominalis Saunders.–Como.
Stigmodera coeruleipes Saunders.–Wahroonga; Blue Mountains.
Stigmodera cupida Kerremans.–Parramatta.
Stigmodera cydista Rainbow.–Sydney, 5 Oct. 1919; Pt. Hacking.
Stigmodera delta Thomson.–Waterfall.
Stigmodera erythromelas (Boisduval).–Parramatta.
Stigmodera inconspicua Saunders.–Dobroyd Pt, 14 Dec. 1923; Waterloo Swamps, Sydney, 1889.
Stigmodera insignis Blackburn.–La Perouse.
Stigmodera luteocincta Saunders.–Parramatta.
Stigmodera maculifer Kerremans.–Ryde, Dec. 1929.
Stigmodera maculipennis Saunders.–Comara, 1 Nov. 1924.
Stigmodera producta Saunders.–Dobroyd Pt. 14 Dec. 1923. Sydney, 1 Dec. 1928; Cheltenham, 7 Dec. 1975 on *Angophora hispida.*
Stigmodera punctatissima Saunders.–Sydney, Oct. 1913; Enfield, 14 Nov, 1903.
Stigmodera rubriventris Blackburn.–Penrith. Sydney.
Stigmodera septemguttata Waterhouse.–Sydney, Dec. 1911.
Stigmodera simulata Laporte & Gory.–Maroubra; Ropes Creek.

Subfamily Chalcophorinae
Diadoxus erythrurus White.–Wentworth Falls, Dec. 1940; George Street, Sydney, 30 Oct. 1940.

Discussion

A minimum of 180 species of Buprestidae are therefore known from the central and western areas of the Sydney Basin and of these, 143 species (or 80%) are here listed as recent records dated over the last decade.

The considerable alienation of the Cumberland Plain since settlement would be expected to have had a marked quantitative effect on species numbers but any attempt to elucidate any qualitative change fails in the absence of early recorded data. Carter (1933) recounts the destruction of collecting habitats in the inner Sydney area once frequented by him but gives little indication of the

species reduction. He mentions (Carter 1933: 21) that more than 100 species are to be found within the Sydney postal district (which would have excluded the adjoining Blue Mountains). This number, allowing for synonyms, is not too removed from our own total.

Regardless of their status prior to settlement, a number of species are presently considered rare within the Sydney Basin. The more noteworthy are *Stigmodera armata, S. neglecta, S. cydista, S. affinis* and *S. goryi.* Some evidently are quite local (e.g. *S. balteata*) and a number rarely encountered may, in some seasons, be more commonly found (e.g. *S. limbata, S. grandis*). At least one species may be locally extinct; *Nascioides carissima* was recorded from the Cook's River on *Acacia longifolia* but despite an intensive search has not been found in recent years. Some possibly important refuge areas for buprestids within the near Sydney area, not visited are Lane Cove River Park, Sydney Harbour National Park and several council reserves.

Forty five adult food plant species are recorded by us (Table 1). In addition Hawkeswood (1978) lists a further thirteen species; *Casuarina torulosa* Ait., *C. nana* Sieb. ex Spreng., *Themeda australis* (R.Br.) Stapf., *Acacia linifolia* (Vent.) Willd., *Leptospermum phylicoides* (A.Cunn. ex Schau.) Cheel, *Angophora floribunda* (Sm.) Sweet, *A. bakeri* C. Hall, *Eucalyptus piperita* Sm., *Bursaria spinosa* (Cav.) Druce, *Cassinia compacta* F. Muell., *C. incata* A. Cunn. ex DC., *Banksia spinulosa* Sm., and *Dodonaea triquetra* Wendl. Nikitin (1979) lists *Banksia serrata* L.f. and *Melaleuca styphelloides* Sm. and Froggatt (1892), *Pultenaea stipularis* Sm.

The Gymnosperms are poorly represented; the most interesting association with these being Carter's record of *Xyroscelis crocata* from *Macrozamia* sp. (Carter 1933). This buprestid is apparently rare as Mr C. E. Chadwick (pers. comm.), in a lengthy study of insect/*Macrozamia* associations has not yet encountered this beetle. Carter (1933) also refers to *Diadoxus erythrurus* occurring on introduced pines but we did not take this species. It is apparently a species found inland on native *Callitris* pines.

Our observations have shown that very few adult buprestids are specific at the plant species level. At the family level *Ethon* appears restricted primarily to the Fabaceae as well as some species of *Melobasis* and *Cisseis.* With the onset of summer, however, *Cisseis* occur readily on a number of plant families, particularly the Myrtaceae (Leptospermums) and the Mimosaceae (Acacias). *Melobasis* may readily be found on *Acacia* but, with our experience, more often outside of the study area.

The Myrtaceae unquestionably dominate the food plants recorded, both in actual plant species numbers and the biomass of buprestids encountered upon them. *Stigmodera* occur periodically in very high numbers and may play a significant pollinator role within this plant family as we have seen large amounts of pollen adhering to many of the beetles examined. Fossil evidence suggests that beetles have played an important role in the pollination of plants (Matthews 1976) and our study indicates that this role is continued within the Myrtaceae

by *Stigmodera*. The *Stigmodera* would appear, from their preference for species of the Myrtaceae, to be oligolectic at the family level. A similar situation is apparent in Australian bees where they are generalistic feeders within the Myrtaceae but where the occurrence of a narrower oligolectry has not been verified (Michener 1970).

One aspect of plant morphology in particular would appear to further support the pollinator role of flower-frequenting *Stigmodera*. Most Myrtaceae have dish-like, shallow flowers. The flower-frequenting buprestids are not structurally equipped to efficiently exploit flower species with tubular blossoms (Matthews 1976) and this would probably explain the relative paucity or absence of *Stigmodera* on many plant species with this type of floral morphology. Armstrong (1979) lists a minimum of 28 Coleoptera and 44 Diptera families as containing anthophilous species and notes that the Australian bee fauna is exclusively flower-frequenting. Although a diverse invertebrate pollinator array frequently can be observed in Myrtaceae communities of the Sydney region, their aggregate biomass often is exceeded by that of *Stigmodera* alone. Ants, which at times can be numerous on blossoms, are viewed by us as "nectar-thieves" (as defined in Heinrich and Raven 1972) for our observations would suggest that the ants tend to restrict their visits to individual flowers and therefore may reduce the outcrossing success of that plant (though their visits to single flowers may actually facilitate pollination in "self-compatible" plants). Where buprestids and bees would alight on a plant and actively clamber from flower to flower and eventually fly to adjoining plants ants were observed to feed primarily from a single flower and then return with this energy reward to their nest.

A further energy enticement may be operative within some of the genera of Myrtaceae encountered. The relatively large, dish-like, flowers of *Leptospermum, Angophora* and *Eucalyptus* species may act as small solar reflectors creating a microhabitat sympathetic to a minimum energy expenditure by the buprestid pollinator while it is feeding. Such a situation occurs in the northern hemisphere where flowers of the family Rosaceae are an energy source to pollinators and provide a microclimate that should reduce the energy expenditure for endogenous heat production in the pollinators (Heinrich and Raven 1972). Pollinators may seek to optimize such a regime by basking and though many *Stigmodera* exhibited, at times, little movement (which could be interpreted as basking) this motionless state, alternatively, may have been a reaction by the beetle to our presence. Thus, while feeding or moving across blossoms, and coupled to the high nectar production rate of these three plant genera, a high energy incentive may be offered to the beetles. The high numbers of beetle pollinators that seasonally can be observed could at least be explained in direct response to the caloric reward from the standing food crop and the staggered emergence times of *Stigmodera* species (Table 2 and our unpublished data) could, in part, be viewed as a means of lessening the competition for that energy resource.

A noticeable successional flowering by representatives of four plant genera, *Kunzea ambigua, Leptospermum flavescens, Angophora hispida* and several

Eucalyptus species, was observed at the Heathcote Road and Royal National Park study sites (*Kunzea ambigua* flowering by late October, *Leptospermum flavescens* by mid November, *Angophora hispida* by late November and *Eucalyptus* species by mid December). There is, however, a variable degree of overlap, at times quite lengthy. Buprestidae noticeably progress from species to species as the season advances. This staggering of flowering is probably explained as a strategy by which the various species compete for the pollinator array available at any one time. Pollination success, within this Myrtaceae assemblage, would be increased and the need for pollinator competition by the plants reduced if the different species in the potential energy crop staggered their flowering times (Heinrich and Raven 1972, Matthews 1976). Failure by a member of such a flowering sequence to produce adequate blossoms could result in pollinator mortality and loss of fecundity. The resulting reduction in pollinator numbers would have a consequential effect on the reproductive potential of those plants flowering later in the sequence (Waser and Real 1979).

Large numbers of flower-frequenting buprestids occurring on one or a small number of plants of the same species, but not on surrounding individuals of that same plant species, may be due to intra-specific staggering of flowering by individual plants. This is often most evident in stands of *Angophora hispida* where individual plants progressively appear "well-trodden". The resulting clines in energy reward are evidently acted upon by beetles in the pollinator array. A pheromone response initiated by female buprestids and acted upon by their conspecific males may be partly responsible for these beetle clusterings but a random count of all species present at Heathcote Road and Mt. York revealed that females were never outnumbered by males.

Angophora hispida and *Leptospermum flavescens* respond to periodic habitat disturbance (such as the rough grading of roadside nature strips) and readily re-establish to form almost monospecific stands. These are maintained for some years, but gradually break up under increasing pressure from incoming colonizers slowly establishing themselves. These monospecific or species poor stands are seasonally frequented by large buprestid assemblages both high in numbers of individuals and species. The energy resources concentrated by plants in such stands may allow clustering of buprestids of low population numbers. Where plants occur as widely scattered individuals encounter frequency in such buprestid species would be low.

From the results of random foliage sweeps some habitat displacement was evident between three of the genera associated with *Casuarina* spp.(viz: *Germarica, Astraeus* and *Paracephala*). *Astraeus* seemed to prefer tall woodland to sclerophyll forest; *Paracephala* was consistantly found in low open woodland and only on one occasion was a specimen taken in conjunction with *Astraeus*. Species of *Astraeus* were found to coexist as were species of *Paracephala*. *Germarica* was displaced to varying degrees by *Paracephala* at some sites but could be taken commonly in association with *Astraeus*. *Germarica* attained greatest abundance

in sclerophyll forest dominated by *Casuarina* or where *Casuarina* occurred as pure stands. Only at Lapstone were four *Casuarina*-associated genera taken together; *Astraeus* (2 spp.), *Anilara* (1 sp.), *Germarica* (1 sp.) and *Paracephala* (1 specimen only). Studies of niche partitioning would be interesting.

With the encircling national parks, water catchment areas and Commonwealth military reserves forming an almost continuous belt about Sydney's perimeter, the region's Buprestidae would presently appear reasonably protected. However, reserves are small in the western half of the Cumberland plain and the survival of many species in that area is not ensured. Fires which consistently ravage these reserves pose a perceptable threat. It is worth noting that since 1977 many of the sites most rich in buprestid species have been severely burnt. Australian sclerophyll communities are generally believed to have evolved in association with, and as a consequence of, fire but there is no evidence to suggest that these fires were anything more than infrequently occurring events.

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